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Teacher, Author, College President

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AMERICAN JOURNAL OF PHARMACY

AND THE SCIENCES SUPPORTING PUBLIC HEALTH

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OUR COVER

On this page President Griffith editorialized on the pertinent facts of pharmacy every month for twenty years. From time to time we shall be privileged to have his writings grace this space again.

DR. IVOR GRIFFITH

ON March 31, 1941, Dr. Ivor Griffith was elected to the Presidency of the Philadelphia College of Pharmacy and Science.

He was born in 1891 in Rhiwlas, North Wales, Great Britain, the son of Rev. John and Ann Griffith. After an early education in the elementary schools of his native village, he came to the United States at the age of sixteen, and settled in Bangor, Pennsylvania. After completing his high school studies, he entered upon his professional career first as an apprentice in the pharmacy of E. K. Eisenhart, who later encouraged this young man to attend the Philadelphia College of Pharmacy. Receiving the degree of Doctor of Pharmacy from that institution in 1912, he became pharmacist at the Stetson Hospital, in Philadelphia, and then was associated with the late Dean Charles H. LaWall in his consulting practice and laboratory. Appointed instructor in arithmetic at the College in 1916, he also assisted Dr. LaWall in his pharmacy lectures the following year, when the latter became Dean of Pharmacy. In 1919, he was appointed serologist and clinical pathologist at the Stetson Hospital, Instructor in the Nursing School of the Hospital, and later Director of Research of the John B. Stetson Company. He became Professor of Theoretical Pharmacy at the College in 1935, and, on the death of Dr. LaWall, in 1938, he was elected to serve as Dean of Pharmacy.

Dr. Griffith early showed talents in authorship, and, after many contributions to professional and scientific literature, was elected Editor of the *"American Journal of Pharmacy"* in 1921, serving for two decades until his recent resignation from that office to assume his present duties as head of the institution. In 1921, at the Centennial Celebration Commencement of the institution, he was awarded the degree of Master of Pharmacy, for his original research work. In 1935 he was honored with the D. Sc. degree by Bucknell University, and in 1938 was elected to Fellowship in the Royal Society

(*Continued on page 141*)

EDITORIAL

OUR POLICY

On this page the new editor will offer his opinions on timely topics. His thoughts will be as unrestrained as those of his predecessor, and his restrictions will be as boundless.

ELSEWHERE in this JOURNAL there appears a news item calling attention to the election of Dr. Ivor Griffith as President of the Philadelphia College of Pharmacy and Science. The many responsibilities of this position have led Dr. Griffith to relinquish the editorship of this JOURNAL as well as many other activities in order that he may more fully serve the institution in this important capacity.

The new editor assumes this his new position with mingled emotions. To succeed a man possessing such outstanding abilities in journalism is not easy, since even good copy will, by comparison, be likely to seem quite commonplace. The long and distinguished list of men who have served as editor cannot but inspire one to do his very best in order that this, the oldest scientific journal in the field of pharmacy, may continue to occupy that position of respect it has ever held.

These are indeed perilous times and many rapid changes are taking place. It may be that many of our ideas and ways of doing things, in the field of pharmacy as elsewhere, must of necessity change if we are to emerge from this present era into a future in which our position shall be favorable.

This JOURNAL, as its name indicates, wishes to represent the interests of real American pharmacy in its entirety and its pages are open not only to contributors of scientific articles but to anyone who feels that any phase of our profession needs to be reminded of its ideals, aims or delinquencies. The editor does not presume to know just precisely what pharmacy needs nor will articles be rejected simply because they fail to coincide with his views.

Few journals today are in the unique position of being entirely free to print any article without interference or objections from any pressure group and thus does the AMERICAN JOURNAL OF PHARMACY serve to maintain one of the foremost prerequisites of democracy—freedom of press. This privilege is indeed an imaginary one unless some pages that are read by others are available to the individual.

This feature we shall endeavor to maintain unless the bounds of decency or common sense are exceeded. It must be remembered however that the only basis on which any change can properly be recommended with regard to the profession of pharmacy is not, as some think, self-interest, but whether the health and well being of the public as a whole will be improved by such change. Unless pharmacy can continue to demonstrate that by its activity this end is being accomplished it cannot even justify its existence. This should be the meter stick by which all proposed changes should be and must be evaluated and this and this only is, and shall be the policy of our JOURNAL.

For those who remember the many interesting and timely editorials from the versatile pen of Ivor Griffith—consolation. The editor does not intend that these outstanding contributions shall cease and our readers may be sure that this eminent teacher, executive and friend shall frequently give us food for thought through the medium of this JOURNAL which he himself so ably piloted for two decades.

L. F. TICE

BENZEDRINE SULFATE—A CORRECTION

Editor's Note—In the Solid Extracts of March, 1941, statements concerning the action of benzedrine sulfate were made to the effect that they "so upset the body rhythm that even when the drug is withdrawn the burning up and out continues". This statement was in error according to the Smith, Kline & French Laboratories, who have supplied the following information and references to the contrary.

With ordinary therapeutic doses of benzedrine sulfate, various clinicians have reported that there is little or no rise of basal metabolic rate, even after protracted treatment. Beyer (J. Pharmacol. 66:318, July, 1939) stated that the increase was only 15 per cent. after the ingestion of 30 mg. (or three to six times the therapeutic dose), and that the rate returned to the original level within seven to eight hours. Although the effects of thyroid medication can be expected to persist for a week or more after withdrawal, this phenomenon has not been observed in the case of benzedrine sulfate. It should be concluded that benzedrine sulfate aids in weight reduction by way of the appetite mechanism rather than the metabolism.

CORRESPONDENCE

AID TO THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN

IN the January issue this JOURNAL published a letter from the Pharmaceutical Society of Great Britain calling attention to the serious plight of many pharmacists in England as a result of the ravages of war. The Editor offered to forward to the Pharmaceutical Society of Great Britain any contributions for this worthy and charitable cause.

Following is a letter received with a contribution which is all the more commendable when one realizes that it has come from a student group who have responded with a real sense of responsibility in the present crisis.

It is hoped that others will avail themselves of this same opportunity of helping those across the seas from whom the terrible toll of modern warfare is being exacted.

THE ASSOCIATED PHARMACY STUDENTS
IDAHO SOUTHERN UNIVERSITY
1940-1941
Pocatello, Idaho

American Journal of Pharmacy — April 10, 1941
43rd St., Kingsessing and Woodland Avenues
Philadelphia, Pennsylvania

Gentlemen:

In reply to a letter received by this association from Walter S. Deacon, President of the Pharmaceutical Society of Great Britain, we would like to transfer through you a small sum which has been donated by our student group. . . .

Our hope is that this contribution may help shoulder some of the burdens of the present war. We also wish to thank you for your cooperation in this matter.

Yours sincerely,

HOWARD I. SLUSSER,
President, Associated Pharmacy Students, University Idaho Southern.

MANNITOL AND SORBITOL IN PHARMACY

By Henry C. Speel

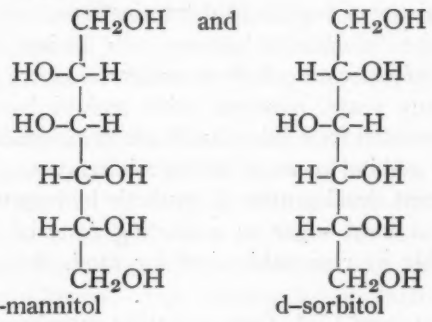
Considerable interest is being shown mannitol and sorbitol not only as glycerin substitutes, but also inasmuch as they seem to possess some points of superiority for certain specific uses. Derivatives of these polyhydric alcohols are also used as vasodilators, emulsifying agents, absorption bases and in the preparation of organo-metallic medicinals. The research minded, pharmaceutical chemist will find much of interest in this article from the standpoint of both improved and new product possibilities.

MORE and more during the past five years the words "mannitol" and "sorbitol" have been appearing on the labels of preparations such as diuretics, vasodilators, prophylactics, laxatives, ointments and other specialties. The use of these chemicals, new to many pharmacologists and practicing pharmacists, has raised a certain amount of interest and resulted in questions being asked by both the pharmacist and user of these preparations. For this reason, a description of sorbitol and mannitol and a few of their many derivatives should prove of general interest. In addition, it might be interesting to give a general idea of the types of preparations in which these chemicals are used and the roles they play as active ingredients in some of the proprietary preparations.

Mannitol, the active ingredient of natural Manna, whose history goes back to Biblical times, has been known to the pharmacist for over a century. Sorbitol, a chemical rarity until a few years ago and now as well known to industry as its close chemical relative mannitol, is also becoming an important factor in certain pharmacal fields.

These polyhydric alcohols are so named because they have two or more reactive hydroxyl groups. The hexahydric alcohols, or "sugar alcohols" as they are sometimes called, with a straight chain of six carbon atoms, and six hydroxyl groups, are illustrated by the following typical formulas:

$C_6H_{14}O_6 = C_6H_8(OH)_6$ or



d–mannitol d–sorbitol

It will be noted that the well known trihydric alcohol, glycerol (glycerin) ($C_3H_8O_3$), belongs to the same chemical family, and that its molecule is roughly only half the size of the mannitol or sorbitol molecule.

Whereas glycerol occurs naturally only in the combined state as the glycerides composing animal and vegetable fats and oils, mannitol and sorbitol occur only in vegetable products, and in the free state. Mannitol and sorbitol are by far the commonest hexahydric alcohols found in nature. It is interesting that glucose and fructose, the two sugars most closely related to the hexitols, are also the most widely distributed of the natural sugars.

Physically, mannitol is a crystalline powder, colorless, odorless, of faint, sweet taste, non-hygroscopic, water soluble and melting at 166° C. Sorbitol is also a crystalline powder, colorless, odorless, with a faint, sweet, cooling taste, more water soluble than mannitol and is hygroscopic, melting at 97° C. Sorbitol is also offered commercially in the form of water solutions, some of which are non-crystallizing syrup-like products.

Background for Investigation

Mannitol (also called "Mannite") was discovered by Proust in 1806 as the active ingredient of natural manna. Mannitol has long been known for its sweetness and mild purgative action, and hence has been indicated for children, invalids and during pregnancy. Preferably, it is taken in the morning on an empty stomach, diluted in warm water or, better still, in milk. Until recently, mannitol has been restricted in application to this laxative field (cf. U. S. Dispen-

satory) particularly in the Latin countries and to the application in analytical chemistry of boric acid determinations.

Sorbitol (or "Sorbite") has no such ancient background because the cost of extracting it from natural sources has been rather high. For many years, however, wine makers have known of its presence in fermented fruit juices and have therefore devised a method of analysis for sorbitol so as to detect adulteration of genuine grape wine. The recent development of synthetic hydrogenation processes, using glucose or corn sugar as a starting material, has now made sorbitol available at reasonable cost for food, drug and industrial usage.

J. C. Krantz and C. J. Carr and their associates in the Department of Pharmacology at the University of Maryland Medical School have done a great deal of investigational work on these sugar alcohols and their anhydrides during the past decade (2, 7, 14, 16, 18, 19, 20). Among the other American workers are numbered: E. W. West, G. E. Burget and their associates at the University of Oregon Medical School (1, 8, 9); H. W. Smith and his associates at New York University College of Medicine (12); A. K. Silberman and H. B. Lewis (17); J. Rosner and J. Bellows (10, 11); besides a number of others. Hundreds of articles are to be found in the technical literature, particularly in that of Europe.

Metabolism

Both mannitol and sorbitol are precursors of glycogen in many animals (1, 2). In man, sorbitol appears to be utilized to a greater extent than mannitol. Thannhauser (3) claims that the calorific value of sorbitol is practically equivalent to that of glucose, estimating that 98% is used up in the body in building up processes, with only 2% being excreted. The formation of glycogen in the liver apparently (4) follows the following scheme of intermediate metabolism: d-sorbitol→ levulose→ glycogen.

Both sorbitol and mannitol have been used as substitutes for sugar in the diabetic diet during the past decade (5, 6). In Europe, sorbitol has been marketed under the trade name "SIONON", and mannitol has been marketed under the trade name "GLUKONON" for use as diabetic sweetening agents. In the 21st edition of the U. S. Dispensatory mention is made of "DULCINOL", a mixture of mannite (mannitol) and common salt, which had been recommended by Sternberg as a sweetening agent for diabetes mixtures. The sweet

taste and the delay which occurs before mannitol or sorbitol appears in the blood as glucose, thus not overtaxing the impaired pancreas, have led to this usage. They are considered to be in the same class as the sugars, glucose or sucrose, from the standpoint of acute toxicity (7).

Sorbitol has been found by West et al. (8, 9) to have enormous water binding capacity, to be rapidly excreted by the kidneys after intravenous injection and to have 1.88 times the osmotic pressure of sucrose at the same weight concentration. Its solutions are less viscous and more easily injected than those of sucrose and entirely stable to heat sterilization. This finding led to further study and its use as an osmotic dehydrating agent and diuretic (20). It has therefore been suggested "for use in conditions where other hypertonic sugar solutions are helpful—in cerebral edema of uremia, alcoholism, head injuries, and brain surgery—in pulmonary edema and anuria not due to mechanical obstruction."

Rosner and Bellows (10, 11) found sorbitol solutions of value in treatment of glaucoma in reducing the intra-ocular tension when it is greatly increased and is not controlled by the use of miotics alone.

Homer W. Smith and his associates (12) have reported that the clearances of sorbitol and mannitol are identical with the simultaneous inulin clearance in dog and man; they are cleared from the plasma at the same rate as inulin both when the glomerulus is normal and when it is filtering protein. They have also described a modification of the Rappaport (23) method for the quantitative determination in the blood and urine of mannitol and sorbitol and a third isomer, dulcitol, as well as of several of their anhydrides, sorbitan, isomannide and sorbide.

Some Typical Uses

In the manufacture of tablets and of gelatin capsules the hexahydric alcohols are found of value. Sorbitol acts as a binder for tablets, such as yeast tablets, and as a plasticizer for gelatin in capsule manufacture, preventing drying out and degradation. Mannitol is used as a filler in certain types of tablets. Due to their greater chemical stability, as compared with the sugars, mannitol and sorbitol are sometimes used to replace the sugars in certain pharmaceutical preparations where it is desired to give a pharmaceutical elegance to the product.

The hexahydric alcohols (i. e. hexitols) enable the preparation of highly concentrated solutions of certain substances of low water solubility. The high viscosity of sorbitol, in solution, makes it a vehicle for dispersing, or useful as a flocculating agent. The latest formula for the U. S. Navy prophylactic ointment includes sorbitol as a clearing agent in place of cholesterol. It is claimed that the addition of sorbitol to an embalming fluid promotes diffusion and thereby insures cosmetic correction, germicidal effect and adequate preservation.

The Council on Dental Therapeutics of the American Dental Association has accepted a form of aqueous solution, known as Atlas Commercial Sorbitol Syrup, for inclusion in the list of Accepted Dental Remedies (13). Krantz and Carr have established the fact that this commercial solution has no irritating effect on the buccal membranes even following surgical operations. These pharmacological studies on the buccal membranes of animals and human beings utilized toothpaste formulas containing as much as 35% of this commercial sorbitol solution, and mouth wash formulations containing 20% by volume.

Commercial Sorbitol Solution

The commercial sorbitol solution mentioned above (sold under the registered trade names "ARLEX" and "SORBAN") is a clear, water-white liquid, noncrystallizing and chemically stable. It is heavier and more viscous than glycerol, and has a greater stabilizing effect on the moisture content variations of products which must not take up or lose their necessary water content. It acts as a bodying agent and as an emollient, imparting a soft, smooth feel to ointment medicaments and cosmetic preparations. Liquid emulsions of mineral oil containing glycerol have been found to be more stable when glycerol is replaced by this commercial sorbitol solution (21).

Emulsion of mineral oil and glycerine, left; same emulsion with commercial sorbitol syrup replacing glycerine, right. (Courtesy *American Perfumer.*)

Derivatives in Pharmacy

The six reactive hydroxyl groups make mannitol and sorbitol chemical intermediates or starting materials for synthesizing products of exceptional diversity, some of which have already found places in the medical or pharmaceutical field. Sorbitol is the starting material in the synthesis of vitamin C, hundreds of tons being used annually for this purpose. That the hexitols increase the acidity of certain weak acids like boric and arsenious is well known.

When two molecules of water are split off the parent hexitol, the dianhydride, $C_6H_8O_2(OH)_2$ hexide, results; in pharmacy both sorbide and isomannide have been recently introduced as diuretics (14).

Mannitol hexanitrate and isomannide dinitrate have shown depressor response comparable to that elicited by other organic nitrates. Sollmann (15) and Fishbein (22) point out the fact that mannitol hexanitrate has the longest lasting action of any of the vasodilators in the nitrate group. Krantz et al., in their investigations on isomannide dinitrate, found it was not converted to the nitrite by alkali; hence it is more stable, longer acting and probably acts through the intact molecule (16).

The long chain fatty acid esters are surface-active materials, oily or waxy in nature, which serve as emulsifiers for cosmetics, soft drinks, and foods. The hexitan (mannitan or sorbitan) esters are favored for use with animal or vegetable oils, while the hexide (mannide or sorbide) esters are preferred with mineral oils or where acids or electrolytes are present in the emulsion. Most of these give water-in-oil type emulsions, the type ordinarily made with lanolin and lanolin derivatives. They may also be used in conjunction with other emulsifiers to give oil-in-water type emulsions. The simple esters are non-toxic and have a very low incidence of irritation on human skin. The monoöleates are especially favored as emulsifiers and emollients in cosmetic products and in ointments containing medicaments; when combined with petrolatum, a water-in-oil type ointment base with extremely high water absorptive power is obtained.

Using mannide monoöleate as the emulsifier, ointment compositions have been prepared containing medicaments such as zinc oxide, tannic acid, urea, phenol, camphor, calomel, salicylic acid, boric acid, zinc sulphate and aluminum citrate. A typical formula follows:

Mannide Monoöleate	4.5%
Beeswax (white)	2.25%
Petrolatum	27%
Mineral Oil (65-75° Say.)	11.25%
Sulphur	10%
$MgSO_4.7H_2O$	0.2%
Water	44.8%

Mannitol and sorbitol have the property of dissolving several metallic oxides, as well as reacting with alkalies or alkali metals. The bismuth complexes are claimed to be of value in syphilitic treatment (U. S. Patent 1,950,132). Other complexes, such as those with calcium, and the complex iron salt of mannitol monophosphoric acid (German Pat. 338,735), have been described as therapeutic products. Scopomannite, a water solution of the hypnotic drug, scopolamine hydrobromide (or hyoscine hydrobromide), contains 10% mannitol as the stabilizing agent.

Summary

In conclusion, it is hoped that the description of these uses of sorbitol, mannitol and their derivatives will act as a guide to point out how they are being used in recently developed formulations. While not generally available as yet to the practicing pharmacist, these chemicals are receiving sufficient attention throughout the proprietary field to merit the attention and interest of progressive pharmacists.

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(*Continued from page 130*)

of Arts (London). He has also been appointed by Governor Arthur H. James to the Advisory Board of Health of the Commonwealth of Pennsylvania.

Dr. Griffith is a member of the Masonic order, the Welsh Society of Philadelphia, and, for twelve years, the perennial president of the St. David's Society of Philadelphia. He is also a past-president of the Philadelphia branch of the American Pharmaceutical Association.

He is well known as the author of technical works, being co-author of the standard books in professional practice, the *"United States Dispensatory," "Remington's Practice of Pharmacy,"* and the *"Pharmaceutical Recipe Book"* of the American Pharmaceutical Association. He has also compiled a volume of treatises, essays and poems, published under the title of *"Lobscows,"* or *"Gleanings of an Editor's Kitchen."* His fame as a raconteur, linguist and after-dinner speaker is widespread.

The Philadelphia College of Pharmacy and Science, the oldest teaching institution of its type in America, welcomes Dr. Griffith's leadership, and it looks forward to a continuation of its progressive program under his guiding hand.

OBSERVATIONS UPON THE PHOSPHATASE TEST OF MILK

By David Wilbur Horn

The phosphatase test when employed by a capable technician is an excellent indicator of how efficiently pasteurization has been carried out. The author who has personally conducted a very great number of such tests reports on certain of his observations with regard to its proper conduct and interpretation. Based on a paper read before the Conference of Municipal, State and Federal Food, Dairy, Drug and Health Officials on March 6, 1941, this article should be of interest to all connected with the sanitary control of dairy products.

PHOSPHATASE enzymes exist not only in the tissues of many organs of the body, but exist also in the body fluids—including milk.

As their name suggests to the chemist, these enzymes catalyze the hydrolysis of esters of acids of pentavalent phosphorus. After hydrolysis, which is merely the undoing of neutralization, the free acid and the free alcoholic body which together made up the ester, now exist separately in the fluid menstruum in which the hydrolysis took place; and either of these two former constituents of the ester may be tested for as a means of following analytically the hydrolysis.

Esters used in following analytically the activity of enzymes are known in this connection as "substrates". By modifying the pH values, and by using different substrates, several types of phosphatase have come to be recognized. The phosphatase now thought to be the most widely distributed is usually referred to as "phosphomonoesterase A_1".

Phosphomonoesterase A_1, has an optimum activity at pH 9.0-10.0 (It will herein be called merely "phosphatase", from this on.) When its activity is to be studied in milk, since the pH of milk is 6.5-6.7 it is necessary to change the pH of the milk by using a suitable alkaline buffer. Mixtures of milk samples with the "buffered substrate" acquire a final pH of 9.0-10.0, say 9.6, within the pH limits of maximum activity of the phosphatase.

The substrate is, within limits, susceptible of judicious selection. One cannot determine phosphoric acid rapidly and very accurately, and yet the substrate must remain an ester of phosphoric acid (since

we are following a phosphatase enzyme). The base may be varied at will, and when a sodium β glycerphosphate substrate was replaced by a phenylphosphate, the test was greatly advanced along the roads of speed and of practicability and of sensitivity. The phenol, set free along with the phosphoric acid by the hydrolysis fostered by the phosphatase enzyme, can be determined colorimetrically with great accuracy. The colorimetric determination was susceptible of improvement, and when the Folin-Ciocalteu reagent for phenol was replaced by Gibb's test—2.6 dibromquinonechloroimide (commonly referred to as "BQC" or Eastman Kodak chemical No. 2304), great progress was made along the lines of specificity and economy.

The new substrate, disodium phenyl phosphate was in 1938 a rare chemical (our first was imported from England). The commercial product varied widely in pH, contained variable and often excessive amounts of disodium monohydrogenphosphate, and worst of all was likely to contain "free" phenol. This had to be removed of course before the product could serve satisfactorily as a phosphatase substrate.

The new reagent BQC when drawn from commercial sources proved highly variable, for example, in rate of color production. The variable quality and the fact that both the disodium-phenyl phosphate and the BQC are unstable, under ordinary laboratory conditions, when solid or when dissolved, undoubtedly led to misjudgments and contradictions in the earlier results and papers.

Uniformity has been attained largely through the introduction of the substrate buffer and of the BQC, purchased and tested guardedly, each in tablet form. Each tablet costs about 7½ cents, and may save $7.50 a piece in time and materials of the laboratory.

It is not possible to standardize the chemists or others who are charged with the responsibility of conducting a test capable of detecting 1 part of phenol in 20 million parts of fluid medium. It is not possible to find human beings whose body fluids do not contain phosphatase. But it seems possible by selection to put this test in its present forms into capable hands, and to reap richly of the benefits it opens in milk control.

Recent progress, through the years 1938 to the present, has led to remarkable opinions. Take one, from the other side of the milk control situation—the producer's side. D. M. Roger of the Borden Farm Products Co., Brooklyn, writes January 1939: "2 or 3 years

ago we should have been extremely doubtful of a statement to the effect that it was possible, by means of a simple test, to detect underpasteurization of dairy products to the extent of five minutes short holding, a drop of 1 degree in holding temperature (from 143° F. to 142° F.), or the addition of 0.1% of raw milk to efficiently pasteurized milk.

However work done recently has proved that this is possible. A very simple test, as simple as the Babcock test for butter fat, has been developed which has proved to be quick and surprisingly accurate. All our pasteurizing plant test rooms are equipped to perform this test as a regular routine procedure." During 1938, the year preceding this statement, 18,000 phosphatase tests had been run under Mr. Roger's direction.

A quotation from the public health side runs: "It may some day be found that the development of the phosphatase tests has been the most important contribution to sanitary milk control since the inception of pasteurization." This quotation is from Dr. John L. Rice, Commissioner of Health of N. Y. City and was made (July 1939) after "more than 100,000 determinations (phosphatase tests) have been made by our staff."

It is with great modesty then that we pass to this test as we have practiced it. We began phosphatase testing as a routine in my laboratory Jan. 14, 1938 using written directions communicated by Mr. Harry Scharer of the N. Y. City Dept. of Health Laboratory. In that same month, Scharer's first paper appeared in print in the *Journal of Dairy Science*. Since that time very approximately 8750 market milks have been put through the phosphatase test in our laboratory—a small number as against the 18,000 of Mr. Roger's, or the 100,000 of Dr. Rice's. But in each of the 8750 tests, the author has prepared the solutions, sampled the milks, and has observed the results.

The rationale of the test is simple. In common with other enzymes, phosphatase is gradually rendered inactive by elevated temperatures; so when milk is heated to some temperature to pasteurize it, inactivation of the phosphatase sets in and progresses as time of heating lengthens. Given a high enough temperature and/or a long enough holding time, complete inactivation of phosphatase will occur. Boiled milk may be used in making "controls."

But among the known enzymes in milk, phosphatase is unique in that it is one enzyme that is but slightly more stable, thermally, than the most resistant of the pathogens in milk—the tubercle bacillus.

Kay and Graham showed that "over the whole temperature range from 140° F. to 167° F. total destruction of the tubercle bacillus occurs before 96% destruction of phosphatase. Absence of phosphatase from a sample of pasteurized milk will therefore be indicative of complete extermination of the pathogenic micro-organisms which may have been present in the original raw milk."

The procedure in general is:

(1)—Add the milk to an excess of buffer substrate in solution (We use distilled water, saturated with chloroform, as the solvent).

(2)—Incubate in water at 98° F. for 10 minutes when one is using the rapid test.

(3)—Let cool and add BQC reagent, to develop blue color, if any. Wait 5 minutes. (I use the pure synthetic CH_3OH in making this solution.)

(4)—Extract the color in neutral normal butyl alcohol and match with permanent inorganic standards, if necessary.

From what has been said, it must be evident (1) that the temperature and time used in pasteurization will determine how much yet *inactivated* phosphatase will normally remain in the so-called pasteurized milk, and (2) that in the test this residual phosphatase will release some phenol during incubation even when the standard time and temperature have been strictly adhered to for the pasteurization. If pasteurization is required at 142° at one place and 145° at another, even with the same holding period, say half-an-hour, the mental deductions from color-results will be different until the duration of incubation in the test is adjusted to a unique value for each set of pasteurizing conditions. Similarly, differences in duration of the required holding period at some fixed temperature will lead to different interpretations until the duration of incubation in the test is adjusted for each set of pasteurizing conditions.

Perhaps there will some day be one and only one temperature-time standard for legal pasteurization, and then interpretations in the results of the phosphatase test will be simpler. In Pennsylvania the ruling of the State Advisory Board requires "not less than 143° for not less than 30 minutes," and "not less than 160° for not less than 15 seconds."

As pointed out by Mr. Roger and by Dr. Rice in connection with the quotations cited, and as is self evident, a test to be most useful must be simple. The simplest seems to be Scharer's Improved Field Test.

This test is performed, as indicated above, directly upon the milk; and by the blue color developed in the presence of the milk. The extraction of the indophenol (the blue color) is only necessary where one wishes to arrive at an opinion regarding the quantitative values of the defects in handling the milk during the supposed pasteurization of every particle of it. In this, Scharer's test, no color is obtained from milk processed correctly at 143° F. for 30 minutes, —and it follows that any milk showing a blue color in the "improved field test" has either been heated at some temperature below 143° for 30 minutes, more or less, or has been heated at some temperature of 143° or more for less than 30 minutes; or had directly or indirectly intentionally or unintentionally, been mixed with raw milk after pasteurization.

In using this test in routine milk examinations of milks pasteurized by the holding process, we have obtained the following results:

Summarizing by half-years

1st half 1938	33	positive tests
2nd " "	13	" "
1st half 1939	10	" "
2nd " "	3	" "
1st half 1940	3	" "
2nd " "	10	" "
	72	total (about 8/10% in all)

The results show:

1—That pasteurization is a practice that merely approaches an ideal, and it is a practice that must not be regarded as 100% perfect over any long run of time, even when the legal definition is a satisfactory one. We all know that perhaps the greatest of all milk-borne typhoid epidemics (1927) involving 5353 recognized cases in Montreal, was from pasteurized milk. And we should know that it abated when after a few weeks the Director of Health ordered the pasteurizing temperature of all milk to be increased from 142° to 146°.

2—When broken down into milks and creams, the results show that small units for adequate pasteurization of small batch bottled products, namely cream and skim milk, are not very common. Roughly, eight per cent. of the creams were positive, and eight-tenths of one per cent. of the whole milks were positive.

3—That the evils exposed by the phosphatase test are evils incident to both city and suburban plants.

4—That attention to the results of the phosphatase test lowers the number of positive findings as time passes. The record of ten positives in the last half year covered would be discouraging were it not that six out of this ten were due to one dealer alone, who over the three years covered was responsible for two-elevenths of all the positives found in the entire survey. The Milk Control Officer traced these in part to "cheating"—we use his word—and there have been no more positives from this source since January 1, 1941.

One producer who was responsible for one-sixth of the total positives, eleven-twelfths of which occurred in 1938, blamed the results upon the delay of the thermometer manufacturer in delivering a thermometer needed to replace a broken one. Another, blamed his upon his inability to get an "indicator". Possibly owners of pasteurizing plants will have to follow the example of the automobilist who carries a spare tire, and whose agency carries spare parts. We have encountered "speed artists" who draw off cautiously part of the milk before the holding time is up—carefully avoiding exposing the thermometer bulb—and thus facilitating their program of "early to bed"—in the wee small hours of the morning. Sundays and holidays also may have this "speed" effect.

Rogers gives a detailed list of many of the causes unearthed by the phosphatase test in the Borden plants referred to, and we have encountered some of them, too. Roger's list is most suggestive and may well be read by every sanitarian who goes into pasteurizing plants.

The author trusts that he has not tired the reader with these observations. Throughout, his aims have been:

1—To interest and to encourage those who may have been dismayed by the complexity of some of the Journal articles upon this subject;

2—To emphasize the simplicity of one technique that may be used;

3—To bring out clearly the hypersensitiveness of the chemicals involved,—for even phenol-resin stoppers must be avoided because of the phenol that in time vaporizes from them;

4—To show that real good can be produced at relatively small expense, by the aid of the phosphatase test of milk.

Dr. Cary Eggleston Elected President of the United States Pharmacopœial Convention

The Board of Trustees of the United States Pharmacopœial Convention at a recent meeting elected Dr. Cary Eggleston of New York City as President. Dr. Eggleston succeeds the late Dr. Charles W. Edmunds, of Ann Arbor, Michigan.

Dr. H. A. B. Dunning, the First Vice-President at the time of Dr. Edmunds' death, had declined the nomination, feeling that the usual custom of having a physician President should be continued.

Dr. Eggleston studied in the University of Jena, Germany. He graduated from Cornell University Medical College in 1907 with the degree of M. D. and is now consulting physician at the New York Infirmary for Women and Children; consultant cardiologist at the Willard Parker Hospital and the Hospital for Ruptured and Crippled. He is visiting physician, Bellevue, Second (Cornell) division; associate attending physician, New York Hospital; associate professor clinical medicine, Cornell University Medical College; fellow of the A. M. A.; fellow of New York Academy of Medicine; fellow of the Association of American Physicians; fellow emeritus American Society for Clinical Investigation. He holds membership in the New York Heart Association, American Heart Association, etc. He is Editor of the Progress of Therapeutics Department, *American Journal of Medical Sciences* and author of "Essentials of Prescription Writing" (W. B. Saunders) and of many original researches on pharmacology and therapeutics, especially concerned with drugs acting upon the circulation.

THE EFFECT OF ULTRA VIOLET LIGHT AND SUNLIGHT ON SOLUTIONS OF SOME COLORING AGENTS

By C. Lee Huyck

Many pharmaceuticals must be artificially colored, using a dye which will remain reasonably permanent under exposure to direct sunlight. The author has investigated the suitability of various dyes when exposed to both sunlight and ultraviolet radiation and interesting data are submitted, giving his results.

Introduction

IN preparing solutions of a colorless antiseptic for routine use the inclusion of some suitable dye is often a desirable addition.

The lack of data in the literature on the stability of alcohol acetone solutions of various coloring agents and alcohol acetone solutions of mixtures of coloring agents to ultra violet light and sunlight prompted this study.

Review of Literature

In testing the merits of amaranth and tincture of cudbear as a coloring agent in a series of acid and alkaline N. F. preparations, S. W. Morrison (1) found that preparations colored with amaranth showed little loss of color after standing for five months exposed to bright light. Preparations colored with tincture of cudbear showed a definite loss of color. Acid preparations colored with amaranth showed a slight degree of fading (8% to 31%), while alkaline preparations colored with amaranth showed practically no fading (0% to 18%).

Adrien Albert (2) discussed the merits of the acid dyes used as coloring agents. Although there are acid dyes of feeble fastness to sunlight, their average resistance to radiation is high. The fastest known acid dye is lissamine fast yellow 2GS (C. I. 639) but it does not withstand alkali as well as tartrazine. An extremely valuable pure red dye is azo geranine 2GS (C. I. 31). This dye is much

used in the English Dominions as a food color and it possesses excellent all around fastness. Carboys containing a solution of the dye withstand the most trying conditions of sunlight and intense window lighting. Yet even better all around fastness is possessed by lissamine fast red B. S. The same author (3) discussed in a similar manner the basic dyes used in pharmacy. These dyes are rapidly decolorized by sunlight and should be stored in the dark. They are sensitive to the presence of salt and for this reason are diluted to a type for use with dextrin. They tend to precipitate on negatively charged surfaces such as are often provided by filters, measures, and bottles. Unlike acid dyes they often exhibit a color in the solid state different from the true color given in solution.

R. P. Cole and M. G. de Navarre (4) discussed the stability of various dyes to light. No color should be used in cosmetics which will not be stable for at least 30 days in ordinary daylight or five to ten days in bright sunlight. Acid azo geranine (C. I. 31) is very stable to light in aqueous and in alkaline solutions. Orange G (C. I. 27) is fairly stable to light and is unaffected by mild acid and alkalies. It has been used in foods and medicinals in Great Britain. Patent blue (C. I. 712) is quite fast to light. It is stable to mild alkali and unstable to acids. Of the basic dyes auramine (C. I. 655) and malachite green (C. I. 657) are fugitive. Methylene blue U. S. P. XI cannot be classed as a very stable color. Methylene green (C. I. 924) is reported to be quite fast to light and is stable in mild acid solutions. Methyl violet (C. I. 680) and safranine (C. I. 841) are fugitive to light. Rose bengal (C. I. 777) is too fugitive for practical use.

E. G. Bryant (5) tested various dyes in acid and alkaline solutions. Bordeaux S, tartrazine and amaranth in acid solutions did not change color. Bordeaux B, amaranth, tincture cochineal, tincture cudbear, tartrazine and tincture saffron in alkaline solutions slightly changed their color. As a test for durability against light, a solution of dye was exposed to the ultra violet rays for two hours and tintometric analysis was taken before and after exposure. Tincture of cudbear lost 34.4% and bordeaux B lost 3% of their color while tincture cochineal, amaranth and tartrazine remained the same color.

C. L. M. Brown (6) found acid magenta (C. I. 692) particularly stable for syrup ferrous phosphate while carmine was best for

bismuth preparations. He concluded that bordeaux B (C. I. 88) is the best dye for all around use.

The stability of solutions of all the certified dyes to light has been studied comprehensively by W. H. Peacock (7).

Experimental Data

Various solutions of coloring agents and mixtures of coloring agents containing 0.1% of the antiseptic cetyl pyridinium chloride.* 50% alcohol, 10% acetone with sufficient distilled water to make 100% were prepared. These solutions were divided into three equal parts and stored in colorless crown glass prescription bottles. One part, which served as a control, was stored in a dark closet at room temperature; one part was submitted to ultra violet light and one part was exposed to intermittent sunlight on the roof of the building. The pH of the solutions before the various coloring agents were added varied from 5.6 to 6. The ultra violet apparatus used was the Uviarc Laboratory Outfit marketed by the General Electric Vapor Lamp Company. The bottles were placed at a distance of 31 cm. from the ultra violet source of light. Readings, which were only approximate, were taken at various intervals using the Tintometer type colorimeter with a 1 cm. cell.

*Cepryn chloride—Merrell.

TABLE No. 1

EFFECT OF ULTRA VIOLET LIGHT ON COLORING AGENTS AND MIXTURES OF COLORING AGENTS IN SOLUTIONS CONTAINING

0.1% CETYL PYRIDINIUM CHLORIDE, 50% ALCOHOL, 10% ACETONE AND ABOUT 40% DISTILLED WATER

No. and Composition per 100 cc.	Readings of Controls		After 15 hrs.		After 30 hrs.		After 45 hrs.		After 67 hrs.	
1. Tr. Cudbear 0.5 cc. (NF VI)	Blue	3.0	Yellow	1.0						
	Red	19.9	Red	0.7		0		0		0
2. Amaranth 0.05 Gm.	Red	29.9	Red	29.9	Red	29.9	Red	29.9	Red	29.9
3. Erythrosine 0.025 Gm. Tr. Cudbear 0.250 cc. (NF VI)	Red	19.9	Red	9.9		0		0		0
4. Ponceau 3R 0.050 Gm.	Red	19.9	Red	19.9	Red	19.9	Red	19.9		0
							Yellow	9.0		
5. Ponceau 3R 0.025 Gm. Tartrazine 0.025 Gm.	Red	19.9	Red	9.9	Red	9.9	Red	8.0		0
							Yellow	9.0		
6. Erythrosine 0.050 Gm.	Red	19.9	Red	19.9	Red	19.9		0		0
7. Tr. Cudbear 0.250 cc. (NF VI)	Red	7.0	Red	5.0		0		0		0
Tartrazine 0.025 Gm.	Yellow	29.9								
8. Orange SS 0.050 Gm.	Red	9.9	Red	9.9	Red	9.9	Red	9.9	Red	9.9
	Yellow	22.0	Yellow	10.0	Yellow	10.0	Yellow	10.0	Yellow	10.0
9. Erythrosine 0.025 Gm.	Red	9.9	Red	9.9	Red	9.9		0		0
Tartrazine 0.025 Gm.	Yellow	20.0	Yellow	20.0	Yellow	20.0				
10. Sunset Yellow	Red	9.9	Red	9.9	Red	9.9	Red	9.0	Red	8.0
FCF 0.050 Gm.	Yellow	20.0	Yellow	19.9	Yellow	19.9	Yellow	19.0	Yellow	9.0
11. Hercules Yellow Egg	Red	6.0	Yellow	20.9	Yellow	9.0		0		0
Shade B. S. 0.050 Gm.	Yellow	20.0								
12. Hercules Lemon Yellow	Yellow	29.0	Yellow	19.9	Yellow	0.9		0		0
Shade B. S. 0.050 Gm.										
13. Tartrazine 0.050 Gm.	Yellow	29.0	Yellow	29.9		0		0		0
14. Amacid Fast 0.050 Gm.	Yellow	29.0	Yellow	19.9		0		0		0

TABLE No. 1—Continued

No. and Composition per 100 cc.	Readings of Controls		After 15 hrs.		After 30 hrs.		After 45 hrs.		After 67 hrs.	
15. Naphthol Yellow S 0.050 Gm.	Yellow	19.9	Yellow	19.9	Yellow	19.9	Yellow	19.9	Yellow	19.9
16. Fast Green FCF 0.050 Gm.	Blue	19.9	Blue	19.9	Blue	19.9	Blue	19.9	Red	4.0
	Yellow	20.0	Yellow	20.0	Yellow	20.0	Yellow	9.0	Blue	19.9
									Yellow	9.0
17. Light Green S. F.	Blue	19.9	Blue	19.9	Blue	19.9	Blue	20.0	Blue	19.9
Yellowish 0.050 Gm.	Yellow	20.0	Yellow	10.0	Yellow	9.9	Yellow	9.9	Yellow	9.9
18. Guinea Green B. 0.050 Gm.	Blue	19.9	Blue	19.9	Blue	19.9	Blue	19.9	Blue	19.9
	Yellow	19.9	Yellow	19.0	Yellow	9.9	Yellow	9.9	Yellow	9.9
19. Brilliant Blue 0.025 Gm.	Blue	9.9	Blue	9.9	Blue	9.9	Blue	9.9		0
Tartrazine 0.025 Gm.	Yellow	20.0	Yellow	20.0	Yellow	19.9	Yellow	19.9		
20. Alc. Caramel 3.0 cc.	Red	7.0	Red	3.0						
	Yellow	19.0	Yellow	19.0	Yellow	19.9	Yellow	6.0	Yellow	2.9
21. Ponceau 3R 0.025 Gm.	Red	29.9	Red	29.9	Red	29.9	Red	29.9	Red	29.9
Brilliant Blue 0.025 Gm.	Blue	9.9	Blue	9.9	Blue	9.9	Blue	9.9	Blue	9.9
22. Sod. Indigo Tin	Blue	19.9								
Disulphonate 0.050 Gm.	Yellow	0.9	Yellow	3.0		0		0		0
23. Indigotine (Carmine Blue)	Blue	19.9								
0.050 Gm.	Red	2.0	Yellow	2.0		0		0		0
	Yellow	0.9								
24. Methylene Blue	Red	9.9	Red	9.9	Red	9.9	Red	9.9	Blue	29.9
U. S. P. 0.050 Gm.	Blue	29.9	Blue	29.9	Blue	29.9	Blue	29.9	Red	9.9
25. Brilliant Blue 0.025 Gm.	Blue	19.9	Blue	19.9	Blue	19.9	Blue	19.9	Blue	19.9
26. Brilliant Blue 0.025 Gm. Tr. Cudbear 0.250 cc. (NF VI)	Blue	19.9	Blue	19.9	Blue	19.9		0		0

TABLE No. 2

EFFECT OF INTERMITTENT SUNLIGHT ON COLORING AGENTS AND MIXTURES OF COLORING AGENTS IN SOLUTIONS CONTAINING

0.1% CETYL PYRIDINIUM CHLORIDE, 50% ALCOHOL, 10% ACETONE AND ABOUT 40% DISTILLED WATER

No. and Composition per 100 cc.	Readings of Controls		After 1 wk.		After 2 wks.		After 3 wks.		After 4 wks.		After 7 wks.
1. Tr. Cudbear 0.5 cc. (NF VI)	Red Blue	19.9 3.0	Red	0.9	0		0		0		0
2. Amaranth 0.05 Gm.	Red	29.9	Red	29.9	Red	29.9	Red	29.9	Red	29.9	0
3. Erythrosine 0.025 Gm. Tr. Cudbear 0.250 cc. (NF VI)	Red	19.9	0		0		0		0		0
4. Ponceau 3R 0.050 Gm.	Red	19.9	Red Yellow	19.9 9.9	Red Yellow	19.9 9.9	Red Yellow	19.9 9.9	Red Yellow	9.9 10.0	0
5. Ponceau 3R 0.025 Gm. Tartrazine 0.025 Gm.	Red	19.9	Red Yellow	19.9 9.9	Red Yellow	15.0 9.9	Red Yellow	9.9 9.9	Red Yellow	9.9 9.0	0 0
6. Erythrosine 0.050 Gm.	Red	19.9	Red Yellow	1.9 0.9	0		0		0		0
7. Tr. Cudbear 0.250 cc. (NF VI) Tartrazine 0.025 Gm.	Red Yellow	7.0 29.9	Yellow	19.9	Yellow	19.9	Yellow	9.9	0		0
8. Orange SS 0.050 Gm.	Red Yellow	9.9 22.0	Red Yellow	9.9 10.0	Red Yellow	9.9 9.9	Red Yellow	9.0 9.0	Red Yellow	9.0 9.0	0
9. Erythrosine 0.025 Gm. Tartrazine 0.025 Gm.	Red Yellow	9.9 20.0	Yellow	19.9	Yellow	19.9	Yellow	19.9	0		0
10. Sunset Yellow FCF 0.050 Gm.	Red Yellow	9.9 20.0	Red Yellow	7.0 9.9	Red Yellow	8.0 10.0	Red Yellow	8.0 9.0	Red Yellow	8.0 9.0	0
11. Hercules Yellow Egg Shade B. S. 0.050 Gm.	Red Yellow	6.0 20.0	Yellow	29.9	Yellow	19.9	Yellow	19.9	Yellow	19.9	0

TABLE No. 2—Continued

No. and Composition per 100 cc.	Readings of Controls	After 1 wk.	After 2 wks.	After 3 wks.	After 4 wks.	After 7 wks.
12. Hercules Lemon Yellow Shade B. S. 0.050 Gm.	Yellow 29.0	Yellow 19.9	Yellow 19.9	Yellow 19.9	Yellow 19.9	0
13. Tartrazine 0.050 Gm.	Yellow 29.0	Yellow 19.9	Yellow 19.9	Yellow 19.9	Yellow 19.9	0
14. Amacid Fast 0.050 Gm.	Yellow 29.0	Yellow 19.9	Yellow 19.9	Yellow 19.9	Yellow 19.9	Yellow 19.9
15. Naphthol Yellow S 0.050 Gm.	Yellow 19.9	Yellow 19.9	Yellow 19.9	Yellow 19.9	Yellow 19.9	0
16. Nat. Fast Green FCF 0.050 Gm.	Blue 19.9 Yellow 20.0	Blue 19.9 Yellow 9.9	Blue 19.9 Yellow 9.9	Blue 19.9 Yellow 9.9	Blue 19.9 Yellow 9.9	0
17. Nat. Light Green S. F. Yellowish 0.050 Gm.	Yellow 20.0 Blue 19.9	Yellow 9.9 Blue 19.9	Yellow 9.9 Blue 19.9	Yellow 9.9 Blue 19.9	Yellow 9.0 Blue 19.9	0
18. Guinea Green B. 0.050 Gm.	Yellow 19.9 Blue 19.9	Yellow 9.9 Blue 19.9	Yellow 9.9 Blue 19.9	Yellow 9.9 Blue 19.9	Yellow 9.0 Blue 19.0	0
19. Brilliant Blue 0.025 Gm. Tartrazine 0.025 Gm.	Yellow 20.0 Blue 9.9	Yellow 9.9 Blue 15.0	Yellow 9.9 Blue 15.0	Yellow 9.9 Blue 18.0	Yellow 9.9 Blue 9.9	0
20. Alc. Caramel 3.0 cc.	Red 7.0 Yellow 19.0	Yellow 9.0	Yellow 3.0	0	0	0
21. Ponceau 3R 0.025 Gm. Brilliant Blue 0.025 Gm.	Red 29.9 Blue 9.9	Red 29.9 Blue 9.9	Red 29.9 Blue 9.9	Red 29.9 Blue 9.9	Red 29.9 Blue 9.9	0 0
22. Sod. Indigo—Tin Disulphonate 0.050 Gm.	Yellow 0.9 Blue 19.9	0	0	0	0	0
23. Indigotine (Carmine Blue) 0.050 Gm.	Blue 19.9 Red 2.0 Yellow 0.9	0	0	0	0	0
24. Methylene Blue U. S. P. 0.050 Gm.	Red 9.9 Blue 29.9	Red 9.9 Blue 29.9	Red 9.9 Blue 29.9	Blue 29.9	Blue 5.0	0
25. Brilliant Blue 0.050 Gm.	Blue 19.9	Blue 19.9	Blue 19.9	Blue 19.9	Blue 19.9	0
26. Brilliant Blue 0.025 Gm.	Blue 19.9	Blue 19.9	Blue 19.9	Blue 19.9	Blue 19.9	Yellow 1.0 Red 2.0

Summary

1. Amaranth, naphthol yellow S, ponceau 3R with brilliant blue, and brilliant blue in alcohol acetone solutions are stable to four weeks of intermittent sunlight and 67 hours of ultra violet light.

2. The noticeable lack of correlation between the results of ultra violet light and sunlight in the cases of methylene blue points to the suggestion that ultra violet light is not fully comparable to sunlight in its deteriorating influence on color.

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Adhesive Paste for Bandages and Dressings

In cases of hypersensitiveness to ordinary medical adhesive tape, or where the size or location of a treated area does not warrant the use of such adhesive strips, a special glycerine-containing adhesive, to keep the bandages, dressings or shields in place, should be useful. Such an adhesive paste can be made from:

Zinc oxide	15 gm.
Gelatin	15 gm.
Glycerine	25 gm.
Distilled water	45 cc.

OUR CONTRIBUTORS THIS MONTH

David W. Horn, Ph. D., is well known in greater Philadelphia and vicinity as a sanitation chemist and consultant. Formerly engaged in educational activities he served on the faculty of both Bryn Mawr College and the Philadelphia College of Pharmacy and Science. At present he has restricted his activities to his extensive work in health and sanitation control as well as original research.

C. Lee Huyck, Ph. D., is well known in pharmaceutical circles having published numerous scientific articles in the field of pharmacy. At present Dr. Huyck is a member of the research staff of the Wm. S. Merrell Company, Cincinnati, Ohio. .

Henry C. Speel is a member of the technical division of the Atlas Powder Co., Wilmington, Del. He has been closely connected with the development of large scale manufacture of sorbitol and mannitol and the research which has led to the increasing use of these compounds and their derivatives in various medicinal, food and technical formulas.

PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE ELECTS NEW OFFICERS

AT the annual meeting of the members of the Philadelphia College of Pharmacy and Science, held on Monday, March 31, Dr. Ivor Griffith, Dean of Pharmacy at the College and well-known pharmacist, chemist, author and lecturer, was elected to the Presidency of the institution. He succeeds Dr. Wilmer Krusen, former Director of Public Health of the City of Philadelphia, who has served as President of the College since 1927. Dr. Krusen retired from active duty as head of the century-old scientific and professional institution, and was elected to the post of President-Emeritus.

Among the other officers named were a number who were re-elected, namely, Ambrose Hunsberger, professional prescription pharmacist of this city, as first Vice-President; C. Mahlon Kline, president of Smith, Kline and French Laboratories, for many years one of the city's outstanding manufacturing pharmaceutical houses, as Second Vice-President; and as Treasurer, Dr. Otto W. Osterlund, executive of the Pennsylvania Company for Insurances on Lives and the Granting of Annuities.

Mr. Theodore Campbell, Jr., professional prescription pharmacist of Overbrook, in Philadelphia, continues to serve as Corresponding Secretary; and Dr. W. Wilson McNeary, superintendent of the American Stomach Hospital, Philadelphia, was re-elected to the post of Recording Secretary.

New officers elected at the meeting, in addition to President Griffith, included the selection of Professor Linwood F. Tice, assistant professor in Pharmacy in the College faculty, to the Editorship of the "AMERICAN JOURNAL OF PHARMACY". Dr. Madeline Oxford Holland, former member of the instructional corps and associated with the national professional journals *American Professional Pharmacist* and the *Medical Times,* was elected to serve as Librarian. She takes the place of Mrs. Ada S. Capwell, resigned, who has supervised the reference files and volumes of the library, the largest of its kind in the country, since 1927.

Also re-elected, as Curator of the Museum, was Dr. John N. McDonnell, assistant professor in Pharmacy, and Editor of *American Professional Pharmacist* and *Medical Times*.

The Committee on Publications of the College was also re-elected, and included Dr. E. Fullerton Cook, Professor of Operative Pharmacy of the College and Chairman of the Revision Committee of the United States Pharmacopœia; Dr. J. W. Sturmer, dean of Science; Dr. Mitchell Bernstein, professor of Medicine at the Jefferson Medical College and well-known heart specialist; Dr. Louis Gershenfeld, professor of Bacteriology and Hygiene of the Institution; Mr. John K. Thum, chief pharmacist of the Lankenau Hospital; and Dr. Joseph W. E. Harrisson, assistant professor of Biological Assaying, and outstanding chemist and vitamin specialist.

Members of the Board of Trustees, re-elected to serve for an additional period of three years, were Col. Samuel Price Wetherill, who is chairman of the Board, and a noted humanitarian and civic authority; Dr. Joseph Rosin, chemist, author, and Vice-President of Merck & Company, Inc., manufacturing chemists of Rahway, N. J.; Mr. Henry Brown, professional prescription pharmacist of Scranton, and Dr. W. Wilson McNeary, the College's Recording Secretary.

ABSTRACTS SELECTED

From Current Literature of the Sciences Supporting Public Health

Status of Bio-Assay of the Digitalis Group. H. Gold and M. Cattel. *Science, 93:* 197 (1941). The bio-assay of digitalis is made necessary by the fact that pure principles are not generally available and use is made of crude material or mixtures of glucosides. There are no satisfactory chemical methods for their estimation. The U. S. Pharmacopœia has provided a standard digitalis powder with which samples may be compared by means of an assay on a qualified batch of frogs.

The authors have compared the potencies of several outstanding brands of tincture of digitalis, all labelled U. S. P., by means of the cat method of assay and have obtained results showing a great variance in the strength of the different preparations. Six preparations were tested and the strongest was nearly three times as potent as the weakest. Comparing two glucosides of digitalis by four different methods, different results were obtained as shown in the accompanying table:

Test Method	Digitaline (Mgm)	Lanatoside C (Mgm)
Cat assay	1	0.7
Papillary muscle	1	10.
Oral therapeutic (man)	1	12.
Intravenous therapeutic (man)	1	1.5

When one compares digitaline and lanatoside C by intravenous administration in man, they are found to be nearly of the same potency, but the digitaline is nearly twelve times as strong as lanatoside C by oral administration. It is clear that one of the chief factors in this difference is the degree of absorption from the gastrointestinal tract. The question then arises, which of the known methods yields the correct answer? Which gives results valid for humans?

The two methods with which most work has been done are the cat method of Hatcher and Brody and the one-hour frog method of the U. S. Pharmacopœia. When tincture of digitalis ages it grows weaker by the frog method but its potency changes little by the cat method. The explanation may lie partly in the fact that the frog method involves absorption from the lymph sac, whereas the cat method involves no absorption since here the drug is injected directly into the circulation. The authors have conducted studies in order to determine which method gives results that are valid for man. As criteria of effects they used the ventricular rate changes in patients with auricular fibrillation and T-wave changes in patients with regular sinus rhythm. From the results obtained, it appears that the cat method may be better than the frog method for digitalis in that the intensity of the effects seem to follow in a more direct relationship to the number of cat units. However, there is evidence that the cat method, when applied to purified glucosides, is also misleading.

The indications are that neither the frog nor the cat method overcomes all the obstacles to uniformity among digitalis preparations. The final evaluation must be based on determination in man. Another solution is the use of purified digitalis glucosides which do not require bio-assay. E. E. L.

Sterilization of Air by Certain Glycols Employed as Aerosols. O. H. Robertson, E. Bigg, B. F. Miller and Z. Baker. *Science, 93:* 213 (1941). Liquid aerosols consist of droplets of approximately 1-2 microns in diameter dispersed in air. Larger particles tend to settle out quickly. The theoretical basis for the high bactericidal efficiency of germicidal aerosols is that a very small quantity of a germicidal agent may be dispersed through a relatively large enclosed air space yet, because each droplet contains the same concentration of the effective chemical substance as does the parent substance, the agent is able to act in high concentration on bacteria suspended in the air.

Experiments were conducted with propylene glycol, trimethylene glycol and ethylene glycol in the following manner: known quantities of a bacterial suspension were sprayed into rectangular glass-walled containers. The air was gently agitated by means of a slowly rotating rubber-bladed fan. The number of viable bacteria recoverable from the chamber air was determined by withdrawing a meas-

ured volume of air at a constant rate through a glass funnel suspended directly about the surface of an agar plate within a sealed glass jar. By this means a relatively uniform number of colonies was obtained following the introduction into the chamber of the same amount of standardized bacterial suspension. There is a progressive and quite constant diminution in the number of colonies recovered from successive air samples taken during the period of an hour. For this reason, two identical chambers were used for each experiment, one for the test and the other for the control.

Tests were conducted with several organisms including staphylococcus aureus, pneumococcus I and III, hemolytic streptococcus viridans, B. coli and others. The accompanying table illustrates the results obtained.

The effect of propylene glycol aerosol on staphylococcus aureus.

Time intervals of air samples	Number of colonies on plates from: Control chamber	Aerosol chamber
1. Immediately after bacterial spray	2207	1860
2. Immediately after H_2O in control and aerosol in test	764	1
3. Fifteen minutes later	532	0
4. Thirty minutes later	336	0

Further studies are being conducted on the mechanism of the aerosol action, the physical properties of the germicidal mists, the time duration of their effective action, minimum effective concentrations, and activity of other compounds. Animals breathing aerosol-containing atmospheres for extended periods of time are under observation at the present time. E. E. L.

The Expanding Applications of Wetting Agents. S. Lenker. *Chemical Industries, 48:* 324 (1941). The earliest known wetting agent, soap, has been used for centuries by civilized peoples for personal washing purposes. In the eighteenth and nieteenth centuries sulfonated olive oil came into use as a wetting and dispersing agent. Sulfated and sulfonated oils and fats, in addition to soaps, continued

to be the only wetting agents used up to the time of the first world war. The principal user of these products was the textile industry, where they were used in dyeing and finishing operations.

The first synthetic wetting agents prepared from non-fatty intermediates were the alkylated naphthalene sulfonic acids and their salts prepared in Germany during the shortage of fats which occurred during the war period. Many industries continued to use the new products during normal times and their distribution began to spread. As a result of considerable research, many chemical types of wetting agents of varying solubility, stability and foaming power were developed and their use became more and more widespread.

In this article are listed all those established commercial applications of the presently-available wetting agents. The uses, totalling over two hundred, are grouped under the following headings: textile industry, cotton and linen processing, wool processing, rayon processing, silk and nylon processing, processing other fibers, leather manufacture, fur industry, petroleum industry, paper industry, metal processing, paint industry, cleaners and cleaning compositions, agricultural uses, cosmetic industry, ceramic industry, rubber industry, and miscelloneous uses.

The list is of necessity incomplete and is intended only as illustrative of the multiplicity of the uses of wetting agents. Wetting agents are of potential interest in all wet processing where wetting, penetrating, emulsifying, dispersing, solubilizing, and cleaning are concerned. E. E. L.

Mildew Prevention, H. Wardle. *Textile Colorist, 62,* 809 (1940). Minimum amounts of organic and inorganic germicides required to protect fabric fibers under standard conditions have been determined as follows:

Inorganic	Per Cent.
Ammonium fluoride	0.04
Borax	0.9
Mercuric chloride	0.02
Sodium fluoride	0.15
Sodium silicofluoride	0.15
Thallium carbonate	0.02
Zinc chloride	0.8

Organic	
Benzoic acid	0.05
Cresylic acid	0.01
Dinitrophenol	0.02
Formaldehyde	0.05
Pentachlorophenol	0.014
Phenol	0.13
Salicyl anilide	0.025
Thymol	0.04
Phenylmercuric nitrate	0.01

B. W.

Petroleum Cresylic Acids. J. Campbell. *Soap 17*, 103 (1941). A study of the toxicity of cresylic disinfectants by:

1) Vapor inhalation
2) Per os administration
3) Skin irritation
4) Tissue toxicity (safety margin between concentrations having bactericidal properties and concentrations causing tissue damage)

was conducted.

No essential differences in toxicity of vapors of cresylic acids of various types were observed. However, the higher-boiling petroleum cresylic materials were less toxic when ingested, and less irritating to the skin, than low-boiling cresylic materials. Furthermore, a disinfectant prepared from a high-boiling petroleum cresylic acid was bactericidal at concentrations non-injurious to living chick-heart tissue. This was not the case with similar disinfectants made from lower-boiling cresylic acid. B. W.

SOLID EXTRACTS

Prepared for the readers of the American Journal of Pharmacy by the Editor and his staff

If one were to suggest to the "Queen of the Kitchen" of the average home that she is a scientist, she would probably laugh,—maybe utter the modern retort, "Oh, Yeah?", or some other expression that would suggest that she thought she was being "kidded."

But the fact remains that more operations are carried on in a day in the average kitchen that are explainable by so-called "laws of science" than are being carried out in many chemical and physical laboratories, and by people who, in most instances, know little or nothing of the natural laws underlying the processes. The amazing thing is that but rarely do the operations fail to produce desired results.

AJP

From the snooty society squibs of the Philadelphia Morning Mirage we quote "the bride was gorgeously dressed in translucent cadaverine, carbolic and carbamide, trimmed with a fluffy tulle of silica gel. Her diaphanous and dainty shoes of urea and formaldehyde and her nigh invisible hose of cotton linters silked with bisulfide added much to the artificial character of the whole affair. The maid of honor in vinyl esters, the bride's mother in casein cashmere and the groom in tears, completed the synthetic ensemble."

Nancy Scatterbrain, the mythical society reportress allegedly quoted above, was only showing off her knowledge of the new synthetic fabrics so much in use right now.

AJP

Many of the numerous diseases that afflict man today can be prevented. The nature of the drugs that are so used to ward off disease provides a most interesting subject.

Your physician can help one avoid many illnesses, through sound advice as to the daily conduct of life, and through the use of many medicines now available to him through the modern pharmacy,—both simple and complex substances resulting from extensive and detailed research.

AJP

The remarkable victories of the many sulfanilamide compounds in the war on bacterial infections have opened up new fields of study and given new impetus to many of the biologic sciences.

To mankind these miracle drugs have given added health, even life and greater happiness to countless numbers. Future generations will find comfort when, by means of these "sulfa" remedies, man will succeed in conquering many bacterial diseases which today are the cause of deathly scourges.

The phenomenal success in their use makes automatic the danger of their abuse, and of this we must be careful, lest the possible blitzkrieg on deadly germs be modified or delayed.

AJP

"Pennywise and Pound Foolish" is still the rule by which many are governed in their food purchases. Yet a high price does not always go hand in hand with either quality or wholesomeness. The means are varied by which those who either by purpose or unintentionally adulterate food or defraud the housewife.

Modern science and sensible legislation are combining to protect the unwary buyer, not only of foods but of other commodities. The purchaser must still beware, but it is much easier and less troublesome to be wary these days, for preliminary steps have been taken to insure more honest trading.

AJP

The future news events of the day brought to you by television will broaden your horizon. Athletic games, convention programs and the display of modern inventions will be a part of your daily experience to come.

All this is made possible through the discovery of the ELECTRON, *that minute bit of electricity which forms a part of every atom. Moving at random within the crystal, it is now speeded up and directed at will in the* "ICONOSCOPE," *a new tool in the hands of the television engineers. You will have a* "KINESCOPE" *in your home, another scientific toy with possibilities far surpassing the radio and the motion pictures.*

Science, through research, has been successful in bringing within your sight and hearing the important events from far and near. Yesterday it was a possibility. Today it is a fact. Tomorrow it will be an actuality.

AJP

Since 1932, three methods of producing, artificial radioactivity have been developed; the cyclotron, the Van der Graff electrostatic generator, and the Neutron source.

The production of artificial radioactivity, especially among the elements of low atomic number, not only permits the scientist to transmute one element into another, but it gives him a powerful tool to trace various physical, chemical and physiological processes of nature. The radioactive tracer, itself, is unique, because it relays its position to the seeker, wherever it may be, and entirely without will. No matter where it goes, it can be found.

AJP

Of the common external characteristics of organisms, color is probably the most distinctive. Color is not only a conspicuous feature of vegetation but the pigments, especially the chlorophylls, are closely linked with the physiological activities of the plants themselves.

Plant pigments, contained in plastids or bodies, have chemical natures. Chlorophylls have their own physiological activities, and medicinal and commercial use. Truly, chlorophyll actually can be termed plant blood.

AJP

With the minds of all true Americans attuned to good national defense, the bodies of all true Americans should be tuned to good health, for health is the first line of defense. In these days it is unpatriotic to be unnecessarily ill, for the services of all able-bodied

citizens are needed. The army and the navy, and local, state and national public health services are striving to keep public health at its optimum. General medicine and pharmacy are combining to advance curative and preventive pieces in the doctor's armamentarium. How well they have succeeded is brought out by the statistics indicating a greater life expectancy than ever, and a generally happier and illness-free existence during the longer time we spend as living beings.

AJP

It has been less than twenty years since the world began to learn its "A. B. C.'s" in the science of vitamin nutrition. We are finding it difficult to reconcile the savory sauces of the American table with the chemist's discoveries that certain food value is to be found in a few grains of a vitamin that has been isolated, synthesized, or which still eludes the investigator. Each day we learn more about their role in foods, or as medicines. Some enthusiasts envision today's sumptuous dinner replaced tomorrow by a few pills, but a sound knowledge of the workings of the digestive system discounts this dream.

AJP

Ptomaines, those much maligned substances present in decomposed protein foods, have been proven to be harmless even when present in large amounts. The real factors producing illness and sometimes death when certain foods are eaten may be listed as follows: the food itself may be naturally poisonous, toxins due to bacterial growth may be present, bacteria themselves may cause toxic symptoms, and chemical poisons may have been accidentally introduced. The most frequent cause is the growth of bacteria in the food which when ingested give rise to severe gastro-intestinal disturbances. Thus the salmonella group and the staphylococci are frequent offenders. The proper handling of food is the most essential factor in controlling this hazard and woe unto the happy vacationer who carelessly patronizes the all too common dirty wayside stand where sanitary facilities are all but completely lacking.

BOOK REVIEWS

Candid Opinions of the Latest Scientific Volumes

Hospital Formulary and Compendium of Useful Information. University of California Press, Berkeley and Los Angeles, Calif. 270 pp. including index. Price: $2.00.

This rather interesting and informative little volume is written as a handbook for use chiefly as a guide for the University of California Medical Center Staff and student body. However, inasmuch as the authors have in preparing this work adhered strictly to titles, formulas, and procedures which are standardized throughout the country, it must not be considered as useful only to this group alone.

The contents are quite varied and well chosen and the subjects considered cover such diversified matters as prescription writing vehicles, buffered and isotonic solutions, drugs used in diagnosis, treatment and prophylaxis, data for baby clinic, obstetrics, X-ray, laboratory and clinical procedures, etc. Each subject is of necessity treated in very abbreviated style and yet the salient features may be quickly perceived particularly from the standpoint of what is to be done rather than why.

Although primarily a handbook for those engaged in medicine or its study, the pharmacist will find this little work of interest and of value. By becoming more familiar with the activities of the physician he can quite obviously increase his capacities to serve his drug requirements with intelligence and skill.

L. F. Tice.

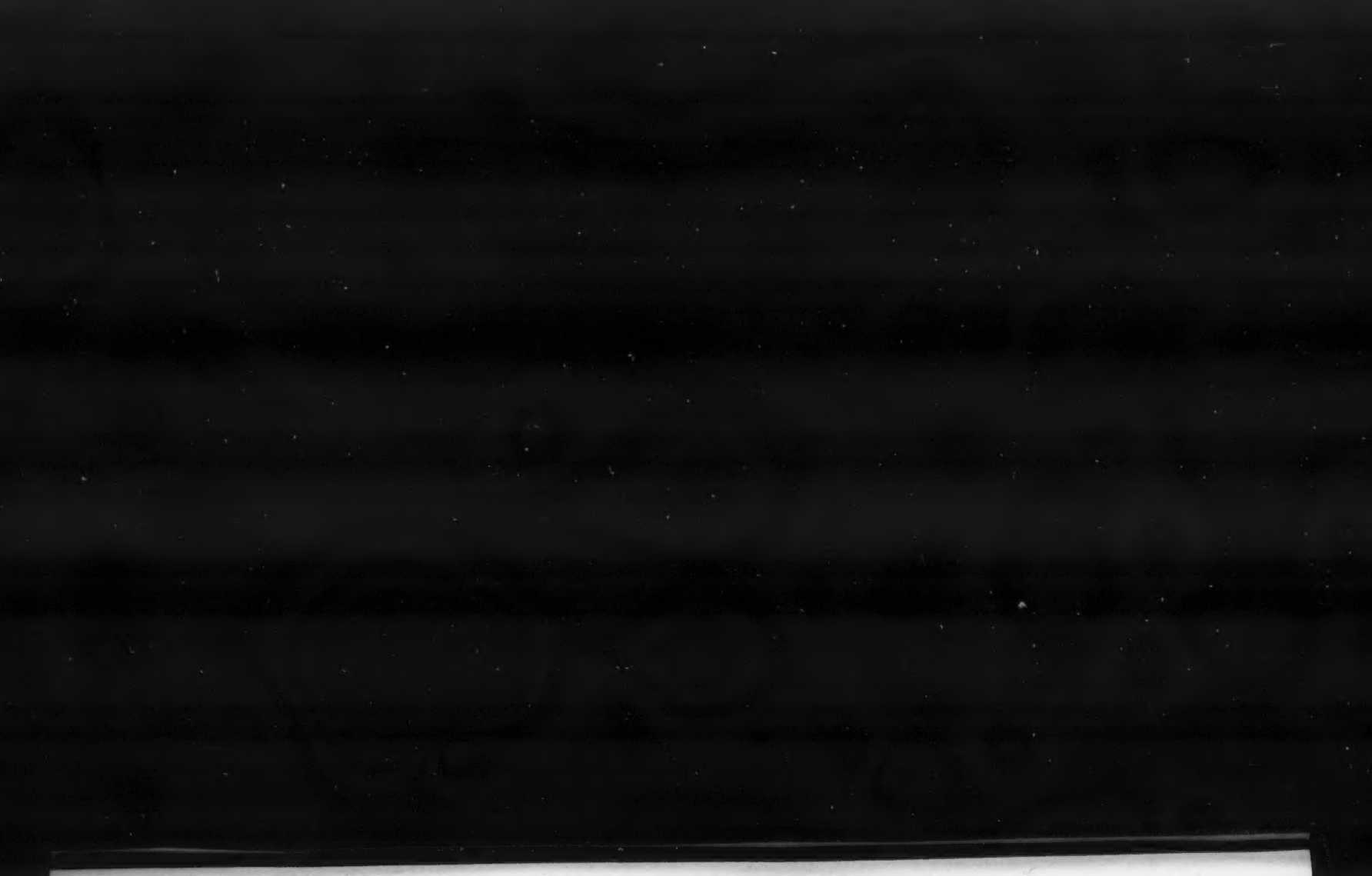
The 1940 Year Book of the National Wholesale Druggists' Association. This volume contains almost 900 pages, approximately three times the size of previous editions. In addition to a verbatim record of the 1940 annual convention, this book gives committee reports which are of paramount interest and value to any one concerned with the business problems of pharmacy. Other material is of even

wider interest. There is a compilation of statistical facts on the number of students in colleges of pharmacy in recent years that was prepared by Dean Robert C. Wilson in connection with an address he delivered at the convention on, "A Continuing Program of Education for Pharmacists."

The Year Book also contains the results of the "Census of Pharmacy" compiled by the National Association of Boards of Pharmacy under the direction of Secretary H. C. Christensen.

In addition, there are the results of the survey of operating expenses of wholesale druggists in 1939 based upon individual reports supplied by 128 different wholesale druggists, representing both in number and in sales volume a substantial proportion of this trade.

Typical also of other material of more than current interest is the elaborately documented and illustrated address by Arthur C. Nielsen on consumer sales of packaged drug and cosmetic products in various types of retail stores. Moreover, using the poll method now so commonly employed for measuring public sentiment, Mr. Nielsen, with detailed facts obtained in a carefully chosen sample of the retail stores of the United States, is able to project the results reported by the sample stores with remarkable accuracy to cover the entire country. Even readers who have no particular concern in market analysis or sales promotion methods will be interested in reviewing, for example, the effects upon consumer sales of a product during the period in which a prize contest is in effect.

Those in particular who are interested in the commercial side of pharmacy will find this volume of interest.

PAUL C. OLSEN.